

REMARKS

Applicant appreciates the time taken by the Examiner to review Applicant's present application. This application has been carefully reviewed in light of the Official Action mailed July 13, 2005. Claims 1-4, 6-8, and 33-39 have been amended. Claims 40-45 have been added. No new matter has been added. Applicant respectfully requests reconsideration and favorable action in this case.

Claim Objections

Claims 1-8 and 32-39 stand currently objected to for informalities. Claims 1-4, 6-8, and 33-39 have been amended for clarification. In particular, "sodium fluorine" has been amended to "sodium fluoride." Accordingly, withdrawal of this objection is respectfully requested.

Rejections under 35 U.S.C. § 103

Claims 1-8 and 32-39 stand rejected as obvious over U.S. Publication No. 2002/011513 ("Margrave") in view of U.S. Patent No. 3,731,495 ("Coveney"). To establish a *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP § 2143.03. Furthermore, it is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983). Moreover, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990), MPEP 2143.01.

Independent Claims 1 and 36

Claim 1 recites,

[a] system for continuous purification of a gas flow comprising:

- a first sodium fluoride trap coupled to a gas supply line, wherein said gas supply line conducts said gas flow;
- a second sodium fluoride trap coupled to said gas supply line in parallel to said first sodium fluoride trap;
- a switching mechanism operable to switch gas flow from said first sodium fluoride trap to said second sodium fluoride trap at the occurrence of a predefined event; and

one or more fluorine generation cells, wherein said one or more fluorine generation cells are coupled to said gas supply line and wherein said one or more fluorine generation cells provide said gas flow.

Thus, claimed is a gas flow purification system having a pair of parallel sodium fluoride traps coupled to a gas supply line conducting a gas flow, where the gas flow is provided by one or more fluorine generation cells coupled to the gas supply line. Independent Claim 36 recites similar limitations. The gas flow provided by the fluorine generation cell(s) includes F_2 , and may also include HF and trace solids. (Specification – Fig. 1) Sodium fluoride ('NaF') traps are chemical traps that react with hydrogen fluoride ('HF'), thus trapping HF and removing it from the gas flow (Specification – [0051]). Consequently, the claimed gas flow purification system allows point-of-use generation of fluorine gas, thus eliminating the hazards and expenses associated with transporting, storing, and handling cylinders of fluorine gas. Further, the parallel arrangement of the sodium fluoride traps provides a redundant system for purifying F_2 gas, thus providing the ability to continue operation of the gas flow purification system while performing trap maintenance (i.e., operate one trap while performing maintenance on the other trap). The claimed gas flow purification system is directed toward providing a process gas for a fabrication process. The system is particularly well-suited for providing process gases to semiconductor fabrication processes. Semiconductor fabrication processes have very low tolerances for contamination and therefore require pure process gases (Specification – [0053]). Furthermore, taking semiconductor-processing equipment out of production to perform maintenance is very costly. Therefore, the claimed gas flow purification system is very desirable because the claimed gas flow purification system generates substantially pure fluorine gas at the point-of-use and has redundant sodium fluoride traps which allow operation of the gas flow purification system during routine trap maintenance.

The cited art does not teach or suggest each and every element set forth in the pending claims. Further, the cited art teaches away from the claimed limitations. Margrave discloses a process for making chemical derivatives of carbon nanotubes and suggests uses for the derivatized nanotubes (Margrave – Abstract and [0009]). However, Margrave neither teaches nor suggests the claimed system for continuously purifying fluorine generation cells coupled to a gas supply line as Margrave is silent as to the production of fluorine.

Furthermore, Margrave neither teaches nor suggests purifying F_2 gas such that a pure process gas may be provided to a fabrication tool. Instead, Margrave appears to teach away from providing a pure gas. For example, Margrave recites, "a method for derivatizing carbon nanotubes comprising reacting carbon nanotubes with fluorine gas, the fluorine gas preferably

being free of F_2 ” (Margrave – [0016]). Furthermore, Margrave recites, “[t]he fluorine, diluted with helium, was then passed through a [process chamber containing carbon nanotubes].” (Margrave – [0106]). Thus, Margrave teaches providing a process gas free from F_2 , (i.e., a process gas that is not pure fluorine). Also, Margrave teaches providing a process gas diluted with helium. Thus, Margrave teaches providing a non-pure process gas. Consequently, Margrave teaches away from the instant invention because the instant invention teaches providing a purified process gas. Margrave, therefore, does not teach or suggest the limitations of the pending claims.

Similarly, Coveney does not teach or suggest the limitations of the pending claims. Nor can Coveney remedy the deficiencies in Margrave such that their combination teaches or suggests the limitations of the pending claims. Coveney teaches a process and apparatus for low temperature rectification of air into nitrogen and oxygen (Coveney – abstract). However, Coveney neither teaches nor suggests fluorine generation cells coupled to a gas supply line. Coveney appears to make no reference to fluorine or fluorine generation cells coupled to sodium fluoride (NaF) traps arranged in parallel as recited by the claimed limitations. Because Coveney discloses an apparatus to separate air into nitrogen and oxygen, Coveney provides neither teaching nor suggestion of the pending claims.

Further, Coveney provides no motivation to modify to meet the limitations of the claimed gas flow purification system at least because Coveney appears to teach away from the instant invention. In particular, Coveney recites cleaning gas flow traps by purging them with nitrogen. An objective of the instant invention is to provide a pure, contaminant-free process gas (Specification – [0006]). To purify fluorine gas, the instant invention recites using sodium fluoride traps. Sodium fluoride traps are chemical traps that react with hydrogen fluoride (HF), thus trapping HF and removing it from the gas flow while allowing the flow of F_2 through the sodium fluoride trap. In contrast, Coveney teaches adsorption traps designed to adsorb air impurities such as carbon dioxide, as described in col. 5, lines 48-62 of Coveney. There is no teaching that the adsorption traps of Coveney trap hydrogen fluoride as do the sodium fluoride traps of the instant invention.

Moreover, in contrast to the limitations of the instant invention, Coveney teaches purging adsorption traps with nitrogen, as described, for example, in claim 18 of Coveney. The instant invention discloses regenerating impurity-filled sodium fluoride traps by heating the sodium fluoride traps and pulling vacuum on them to remove impurities (Specification – [0052]). The

use of nitrogen to purge the traps presents exactly one type of disadvantage the regeneration methodology of the present invention seeds to avoid. Namely, purging with nitrogen introduces contaminants into the process gas flow lines, adversely affecting the manufacturing process (Specification – [0052-0053]). Thus, Coveney can provide no motivation to modify to meet the limitations of the claimed gas flow purification system because Coveney appears to teach away from the instant invention.

Dependent Claims 7, 8, 37, and 39

Dependant Claims 7, 8, and 37 recite a low pressure buffer tank in fluid communication with the at least two sodium fluoride traps. The claimed low pressure buffer tank is described, for example, in paragraphs [0055-0058] of the specification. The cited art does not appear to teach or suggest the claimed low pressure buffer tank. Similarly, dependant Claim 39 recites a negative pressure bulk storage tank and an individual tool compressor. These limitations are described, for example, in paragraphs [0071 -0077] of the specification. The cited art does not appear to teach or suggest either the negative pressure bulk storage tank or the individual tool compressor. If the Examiner maintains the rejection, Applicant respectfully requests the location of these limitations in the cited art.

Applicant asserts that the Examiner has failed to establish a prima facie case of obviousness. There is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there is not a reasonable expectation of success. Because the overall system of Margrave for providing fluorine gas is unknown, we cannot expect to successfully modify this system with any other particular teaching. Finally, the prior art references do not teach or suggest all the claim limitations. For example, the prior art references do not teach or suggest a fluorine generation cell. In fact, the prior art appears to teach away from the claim limitations. The Examiner fails to particularly point out those passages of the cited art which render the claimed limitations obvious. Consequently, the pending claims are not obvious in view of the cited art. For at least these reasons, Applicant respectfully requests withdrawal of the rejection.

Applicant has now made an earnest attempt to place this case in condition for allowance. Other than as explicitly set forth above, this reply does not include an acquiescence

to statements, assertions, assumptions, conclusions, or any combination thereof in the Office Action. For the foregoing reasons and for other reasons clearly apparent, Applicant respectfully requests full allowance of Claims 1-8 and 32-45. The Examiner is invited to telephone the undersigned at the number listed below for prompt action in the event any issues remain.

The Director of the U.S. Patent and Trademark Office is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 50-3183 of Sprinkle IP Law Group.

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